

# Briefing Paper



## Sydney, Transport and Ecologically Sustainable Development

by

**Stewart Smith**

**No 017/95**

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## CONTENTS

Executive Summary	
<b>PART ONE: INTRODUCTION</b>	<b>3</b>
The Costs of Travel	4
<b>PART TWO: CHRONOLOGICAL LIST OF PLANNING STRATEGIES FOR SYDNEY</b>	<b>5</b>
Country of Cumberland Planning Scheme 1948	5
Sydney Region Outline Plan 1968	6
Sydney Area Transportation Study 1974	6
Roads 2000, 1987	7
Sydney's Future and the Integrated Transport Strategy, Draft Strategies, 1993	7
Cities for the 21st Century	8
<b>PART THREE: GROWTH AREAS OF SYDNEY</b>	<b>8</b>
<b>PART FOUR: ECOLOGICAL SUSTAINABLE DEVELOPMENT PRINCIPLES AND TRANSPORT</b>	<b>11</b>
Improvement in material and non-material well being	11
Intergenerational Equity	11
Intra-generational Equity	12
Maintenance of Ecological Systems, Protecting Biodiversity	12
Global Ramifications	12
Dealing Cautiously with Risk, Uncertainty and Irreversibility	13
Conclusion of ESD Discussion	13
<b>PART FIVE: MODES OF TRANSPORT</b>	<b>13</b>
Roads	14
Car pooling	16
Parking controls/pricing	17
Cycling as transport	18
Buses	18
Improving the Urban Bus Service	19
Trains	20
On Demand Services/Personal Public Transport	21
<b>PART SIX: CONCLUSION</b>	<b>23</b>

## **Executive Summary**

Urban travel in Australia has almost doubled in the twenty years up to 1991. The private motor vehicle is almost solely responsible for this increase. During the same time the patronage of public transport has remained virtually constant. This dependence on the car has resulted in congested cities, air and noise pollution and communities divided by roads (page 1).

The costs of travel for buses, trains and cars show that cars have the highest estimated cost in total per person kilometre, as well as the highest societal costs (page 2).

An analysis of the planning documents for Sydney from 1948 indicate that many of the problems we faced over 50 years ago have still not been solved today. City plans have highlighted the need to ensure a more compact city, with greater urban densities (page 5). The relationship between land use and transport cannot be underestimated. One ideal planning method is to have clusters of development around transport nodes).

Within the next 25 years, Sydney is expected to have a population of 4.5 million people, requiring 520,000 new dwellings. The residential growth areas of Sydney include the Rouse Hill/northwest sector; Hoxton Park, southwest sector; and consolidation in the City West/Southern Railway and Rhodes Peninsula areas (page 10).

One way to select transport modes and networks is to compare them with the following ecologically sustainable characteristics, having regard to:

- Intergenerational equity
- Intra-generational equity
- Maintenance of ecological systems and protecting biodiversity
- Global ramifications
- Dealing cautiously with Risk, Uncertainty and Irreversibility.

Presently, many of the current transport patterns violate ESD principles (page 11).

Whilst there have been several major additions to the road network over the last decade, road congestion and traffic problems still present large problems for Sydney (page 15).

There has been comparatively little extension of the rail network over the last decade. Much of the rail network is now at capacity, and construction of new track is either underway or planned to cater for this (page 20).

Personal Public Transport appears to be worthwhile and should be investigated and trialled further in Sydney (page 21).

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## PART ONE: INTRODUCTION

The amount of urban travel in Australia has almost doubled in the period 1971-91. The motor car is almost entirely responsible for this increase, as during the same period the amount of travel by public transport has remained virtually constant. Public transport's share of total journeys has fallen from around 13 percent in 1971 to about eight percent in 1991.<sup>1</sup>

Currently, many consider that the environment of Sydney, and hence its livability, is deteriorating. Concerns include air and water pollution, loss of urban bushland and noise pollution. Whilst these problems may not affect all people, there is one aspect of city living that it is very difficult to avoid being affected by: transport, and the problems caused by transport.

Transport in the Sydney region is characterised by:

- congested roads
- resultant air and noise pollution from traffic
- at capacity public transport system
- lack of access to public transport, especially in new growth areas
- roads dangerous for cyclists, pedestrians and motorists
- freeways and six lane roads dividing communities and promoting greater car use

Transport has always been an important issue for Sydney, and in response has been the subject of several Parliamentary Library Research Service Publications.<sup>2</sup> This paper looks at the growth areas of metropolitan Sydney and outlines the principles of ecologically sustainable development as applicable to transport. The paper attempts to highlight ecologically sustainable transport options to service Sydney's growth areas. To put the paper in perspective, the costs of transport are briefly outlined below.

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<sup>1</sup> Industry Commission, 1994, *Urban Transport, Volume 1:Report*. Report No. 37. AGPS Canberra

<sup>2</sup> See for example:

Rose, S., 1993, *Sydney's Future and The Integrated Transport Strategy, a Summary*. NSW Parliamentary Library Briefing Note No.001/93.

Black, J.& P. Rimmer, 1992, *Sydney's Transport: Contemporary Issues, 1988-1992*. NSW Parliamentary Library, Background Paper.

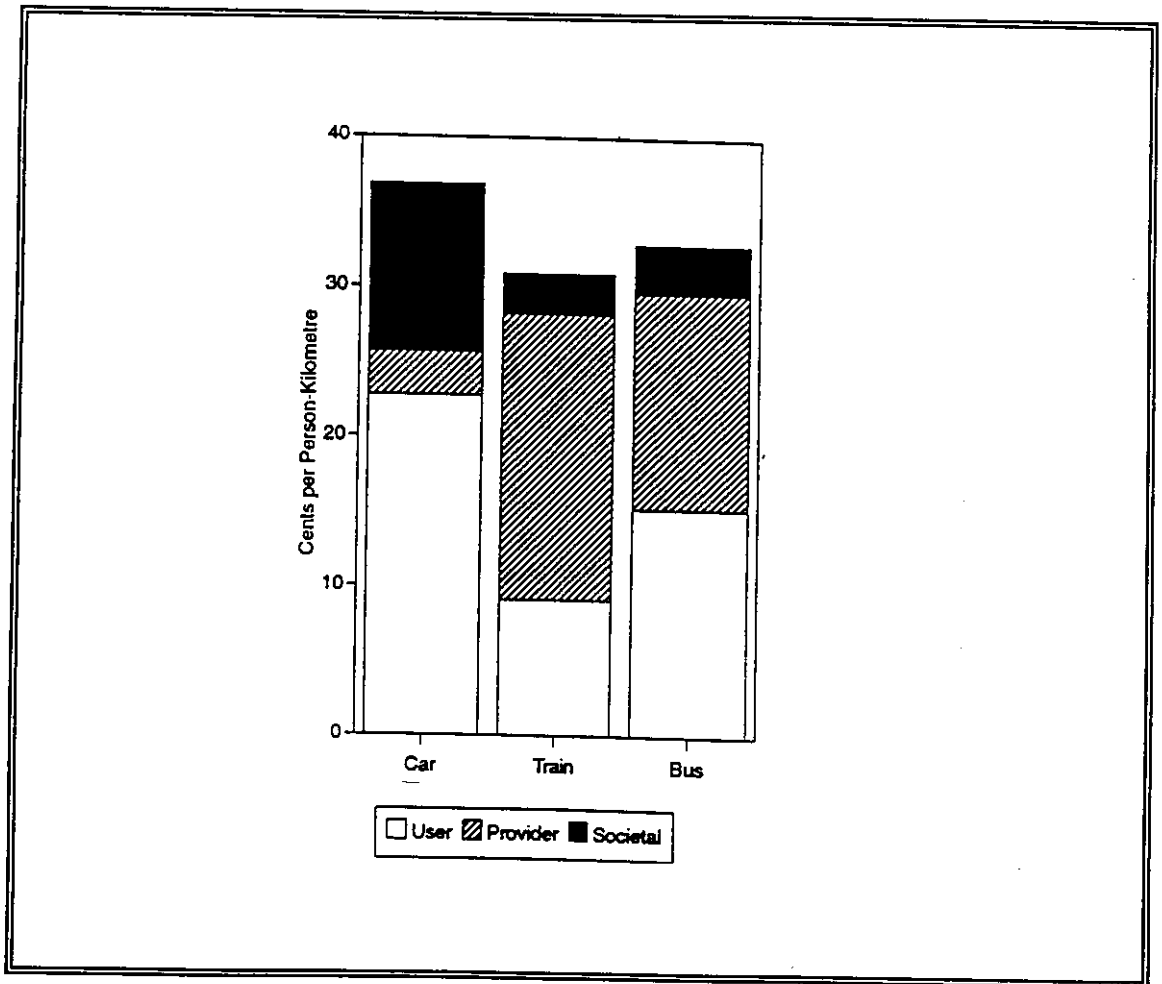
Black, J.& P. Rimmer, 1987, *Sydney's Transport Problems*. NSW Parliamentary Library Background Paper 1987/4.

## The Costs of Travel

The Australian Road Research Board has estimated the costs of various types of travel in Australia. The costs were divided into three general groups:<sup>3</sup>

- User costs - costs born by the individual traveller such as petrol for car trips, and fares for public transport
- Provider costs - costs born by the provider of the transport, such as construction and maintenance of roads, and the costs of public transport not covered by fare revenue.
- Societal costs - external costs which are born by the community in general, including things like air pollution, noise and congestion.

Figure 1 Estimated Cost per person kilometre of Travel<sup>4</sup>



<sup>3</sup> Austroads, 1994, *Cost of Personal Travel*. Austroads, Sydney.

<sup>4</sup> *Ibid*, p.1-2.

Whilst Austroads cautions about the accuracy of the above estimates, they consider that the magnitude of the totals for each mode is likely to be appropriate. It is clear that the private car is the most expensive transport option, with relatively smaller provider costs but the greatest societal costs. The main societal costs of the car included congestion, air pollution and accidents.

It is worthwhile to note that people tend not to make transport trips for the sake of transport alone, but have to for various reasons, shopping and work for instance. This is why many of the planning documents as outlined in the next section stress the need for compact cities. In these cities, people are located around public transport clusters and do not need to travel across the city for services and employment location.<sup>5</sup>

## **PART TWO: CHRONOLOGICAL LIST OF PLANNING STRATEGIES FOR SYDNEY**

In order to understand the present day transport network, it is useful to briefly outline some of the key historical planning documents for Sydney.

### **County of Cumberland Planning Scheme 1948**

This planning scheme, initiated by the McKell Government, was the primary regional plan for metropolitan Sydney. The plan noted some of the problems that were occurring at the time including:<sup>6</sup>

- Over-centralisation and congestion of industry, commerce, shopping, administration and entertainment in and around the City of Sydney
- Congested and confused traffic within the inner areas due to over-centralisation, an outmoded road system, inadequate transport terminals and lack of parking space
- Residential areas sprawled for miles without any real identity or provision for open space, social or cultural life
- Premature subdivision extending over great areas of rural land, forcing the provision of roads and other utilities out of all proportion to housing needs

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<sup>5</sup> For more information on urban consolidation, see

Swain, M., 1995, *Urban Consolidation and Dual Occupancy Development*, NSW Parliamentary Library Briefing Note No. 012/95.

<sup>6</sup> Cumberland County Council, 1949, Statement on the Planning Scheme for the County of Cumberland, New South Wales.



The Cumberland Plan attempted to improve the established radial transport pattern with cross-metropolitan links. The Plan acknowledged the role of the City of Sydney as the centre of administration and trade. Throughout the metropolitan region District Centres were to become hubs of shopping, entertainment and social activities. Industry was to be dispersed to areas close to employees homes.<sup>7</sup>

From the above list, it can be seen that many of the transport and planning problems faced in 1951 are still faced in 1995. Today, we are still trying to remove the radial focus of the transport network, and still talk about people living closer to their place of employment. Many of the Cumberland proposals and transport solutions were simply not put into place. Sandercock writes:

So little eventuated throughout the fifties or early sixties of the plans for a county road system, electric railway extensions...Shortage of funds was not the only reason for the failure of these plans, [the CCC] had to rely on the cooperation and goodwill of other government departments and authorities, and this was not usually forthcoming, their attitudes towards the CCC varying from indifference to hostility.<sup>8</sup>

To perhaps try and avoid some of the above problems of unresponsive and un-coordinated bureaucracies, the new Carr government has announced that the departments of Transport, Roads, Housing and Sydney Water will all have to give up their planning powers to the Department of Planning and Urban Affairs. Mr Carr is reported to have said about some of the departments and utilities, "They will no longer be able to plough ahead with decisions that shape Sydney's metropolitan outline... the Department of Planning will have untrammelled planning power".<sup>9</sup>

### Sydney Region Outline Plan 1968

This plan outlined regions of growth, identifying the north-west areas of Sydney such as Rouse Hill, Marsden Park and Scheyville as future urban growth areas.

### Sydney Area Transportation Study 1974<sup>10</sup>

SATS identified six major transport corridors servicing the needs of an expanding population up to the year 2000. The major corridors were identified as:

- Western, from Penrith to the City of Sydney

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<sup>7</sup> Ibid, p.12.

<sup>8</sup> Sandercock,L., 1975, *Cities for Sale. Property, politics and urban planning in Australia*. Melbourne University Press. Page 183.

<sup>9</sup> Totara, P., 1995, "Carr's vision splendid for Sydney" in *The Sydney Morning Herald*, 6 April 1995.

<sup>10</sup> New South Wales Government, 1974, *Sydney Areas Transportation Study, Summary Report, Passenger Transport Systems*.

- Southwestern, from Campbelltown via Liverpool to the city
- Northwestern, from Rouse Hill to the city via Epping
- Manly-Warringah, from Palm Beach to the City of Sydney
- Southern, extending from Sutherland to South Sydney and City.

It is interesting to note that all these corridors re-inforce the radial road pattern leading into the city. Eight minor corridors were also identified, with the two main ones:

- Liverpool - Castle Hill
- Parramatta - Epping

If the 1974 SATS plan was fully implemented, Sydney would be criss-crossed with freeways and expressways. The recommended highway system contained 342 miles of new freeways and expressways, 150 miles of new major regional roads and 240 miles of major regional roads to be upgraded, at a total cost of \$2,252 million (1971 dollars).<sup>11</sup>

Railway services were also to be upgraded, with some of the major features including; major suburban line from Newport to St. Leonards, extension of line to Hoxton Park from Parramatta, new line to connect Hornsby with Parramatta via Carlingford and a new line servicing Parramatta to Rouse Hill and Windsor. The total cost of proposed railway facilities was \$1,162 million (1971 dollars).<sup>12</sup>

### **Roads 2000, 1987<sup>13</sup>**

This document was prepared by the then Department of Main Roads, and as stated by Laurie Brereton the Minister for Roads at the time, the plan included:

- second Harbour crossing
- Eastern Distributor
- completion of three major east-west freeways, Castlereagh, Southwestern and Parramatta
- an orbital road route linking all major incoming highways for distribution across the city
- construction of flyovers to end congestion at intersections.

### **Sydney's Future and the Integrated Transport Strategy, Draft Strategies, 1993**

These two documents plan for a Sydney population of 4.5 million people by the year

<sup>11</sup> *Ibid*, p.1-12.

<sup>12</sup> *Ibid*, p.1-22.

<sup>13</sup> New South Wales Department of Main Roads, 1987, *Roads 2000 Sydney Region*.

2011. Key transport corridors were identified, with Parramatta a key growth area.<sup>14</sup>

### Cities for the 21st Century

In January 1995 the NSW State Government released the report "Cities for the 21st Century", a strategy for planning the future of the Greater Metropolitan Region of Sydney, Newcastle, the Central Coast and Wollongong.<sup>15</sup> The vision for the Region is that it be "a dynamic, sustainable and diverse community built on the Region's prominent position in the New South Wales, Australian and the Asian Pacific economies and one which enhances its special natural and cultural environment".

To fulfil this vision four basic goals are identified:

- equity
- efficiency
- environmental quality
- livability.

The following key principles are to be applied when implementing the strategy:

- more compact cities
- an ecologically sustainable region
- effective implementation.

The strategy document highlights the need to integrate land use and transport, and details the level of growth that Sydney will have to cater for well into the next century.

### PART THREE: GROWTH AREAS OF SYDNEY

The Cities for the 21st Century document estimates that within the next 25 years, the population of the Sydney metropolitan area will increase from 3.75 million to 4.5 million people, an increase of 20 percent. To house these people, 520,000 new dwellings are required. It is targeted for two-thirds of new housing to be built in established areas and one-third in greenfield estates (ie, in those areas not previously used for urban purposes).<sup>16</sup>

<sup>14</sup> For more information on these two strategies see

Rose, S., 1993, *Sydney's Future and The Integrated Transport Strategy. A Summary*. NSW Parliamentary Library Briefing Note No.001/93.

<sup>15</sup> New South Wales Government, Department of Planning, 1995, *Cities for the 21st Century. Integrated Urban Management for Sydney, Newcastle, the Central Coast and Wollongong*.

<sup>16</sup> New South Wales Government, Department of Planning, 1995, *op. cit.* p.105.

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It is predicted that 15 percent of housing requirements can be met by the development at City West, along the new Southern Railway, on the Rhodes peninsula and the Olympic Village. A further 10 percent can be supplied from non-residential sites that can be identified as redevelopment opportunities.

New greenfield developments will be concentrated in the growth areas of the northwest sector (30 percent of development), the combined areas of Fairfield, Liverpool, Campbelltown and Camden (43 percent), Wyong (7 percent) and the remaining 20 percent in a range of other fringe local government areas.<sup>17</sup>

An important association with housing location is employment location. The Cities for the 21st Century document noted that of the 1,575,000 jobs with known locations, 47 percent were located in just nine spatial areas. The significant locations were:

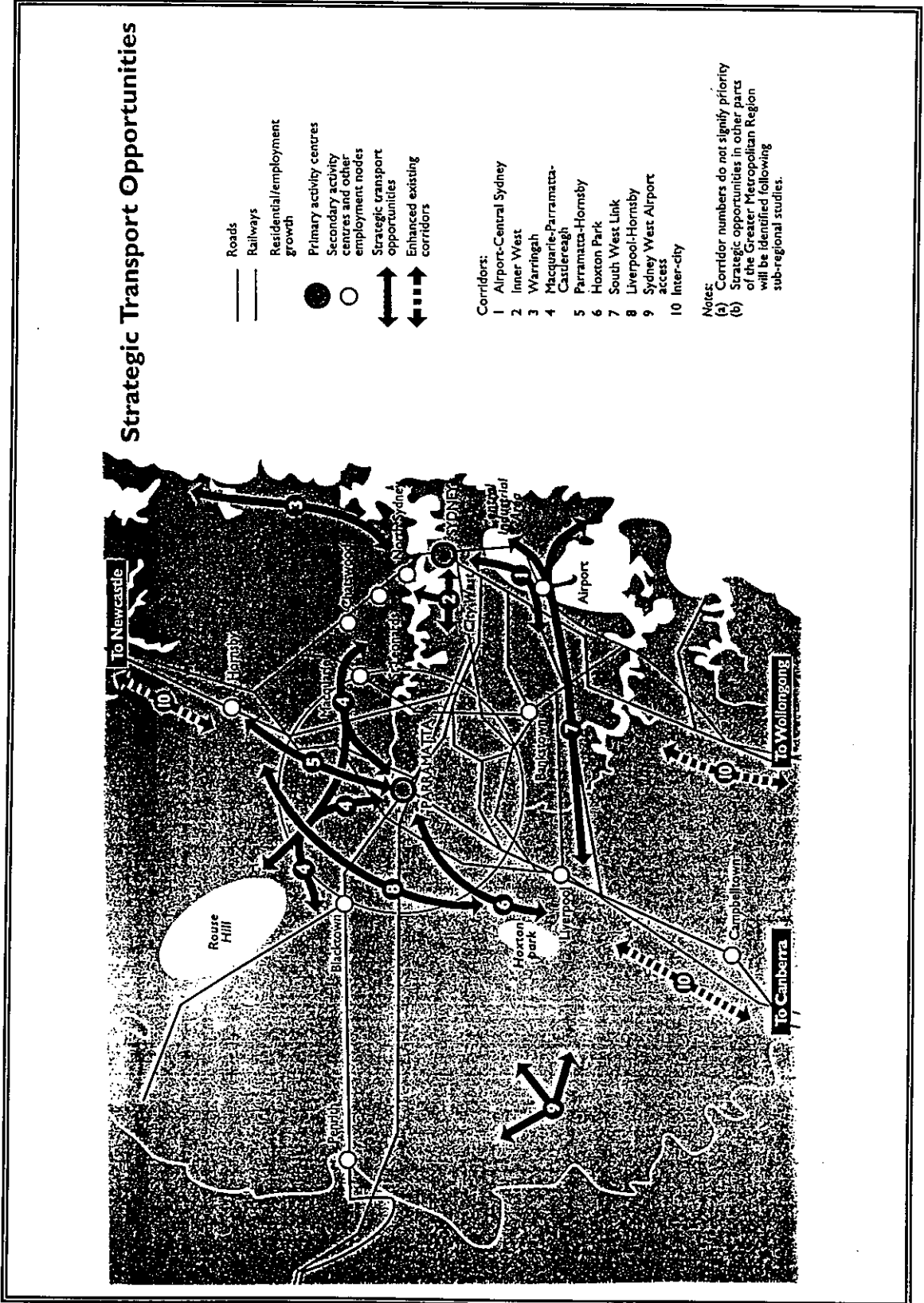
- Chatswood to Botany, focusing on the Sydney CBD with 28 percent of total employment
- The second largest is the east-west axis from Burwood to Westmead and centred on Parramatta with 7 percent of total employment
- Three spatial concentrations of employment in the middle to outer suburbs contained another 8 percent, centering on Macquarie, Bankstown to Liverpool, and Villawood-Wetherill Park.
- The outer suburban areas of Blacktown, St. Mary's, Penrith and Campbelltown together contained another 4 percent of total employment.

Figure 2 shows the growth areas of Sydney and strategic transport routes to service these areas. The map shows the increasing importance of Parramatta as a Primary activity centre, and the transport links to service this area.

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<sup>17</sup> *Ibid*, p.105.

Figure 2 Growth areas of Sydney and Strategic Transport Opportunities.<sup>18</sup>



<sup>18</sup> Ibid, p.99.

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## **PART FOUR: ECOLOGICAL SUSTAINABLE DEVELOPMENT PRINCIPLES AND TRANSPORT**

In 1991 the Ecologically Sustainable Development (ESD) Working Group on Transport released their final report.<sup>19</sup> The working group identified six key principles of ESD, and related these to the transport sector. The following discussion relates to these six key principles and is drawn from the ESD Transport Report.

### **Improvement in material and non-material well being**

Transport contributes to material well being by meeting needs for movement of goods and personal travel. Transport also impacts on non-material well being both positively and negatively through social mobility, air pollution, noise and so on.

The Working Group on Transport considered that achieving consistency with ESD requires that the transport sector be technically efficient, that resources used in performing a given transport task be minimised, and that transport activity associated with a particular level of goods and services itself is minimised. Decisions on transport options should take into account full environmental and social costs associated with them.

### **Intergenerational Equity**

The kind of transport sector that the current Australian generation develops has implications for future generations and the environments they will live in. The principles of ESD state that the current generation should leave a quality of life and an environment for future generations at least as good as that which it inherited.

The application of this principle has ramifications for: the technology, mix of modes used and levels of activity for the transport sector. The Working Group notes that efforts to find a cleaner transport technology, more environmentally benign source of transport energy, or ways to reduce the demand for transport or satisfying increasing demand with less resources are needed.

This principle has ramifications on choice of fuel used for transport. Currently, transport options rely heavily on non-renewable fossil fuels. This may diminish the options available for future generations and contributes to climate change which will affect future generations. The price of fossil fuels is likely to increase with scarcity, promoting the use of alternatives. However, the Working Group considered that the market mechanism may be unlikely to be sufficiently strong to bring about change that meets the requirements of the intergenerational principle.

One way to ensure that the current generation consumes and recycles non-renewable resources as efficiently as possible is to price fossil fuels to reflect the full

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<sup>19</sup> Commonwealth of Australia, 1991, *Ecologically Sustainable Development Working Groups Final Report - Transport*. AGPS Canberra.

community costs of transport use. These costs should include economic, social and environmental factors.

The provision of transport should be conducted in a manner that does not destroy or put at risk natural systems and resources that are non-substitutable, multifunctional, and the impacts upon which are uncertain and irreversible. This includes biodiversity, freshwater supplies, clean air and productive soils.

The intergenerational equity principle also raises the question of the extent to which the current generation invests in capital for future use, as distinct from allocation of resources to current consumption. The choice of discount rate for evaluating investment projects is important, as discount rates reduce the value of future costs and benefits in the decision making process. A lower discount rate favours those projects providing longer - term benefits.

### **Intra-generational Equity**

In attempting to devise a transport system that is ecologically sustainable, the principle of increasing equity at both national and international levels is a goal. Intra-generational equity can be seen as a constraint in the pursuit of other ESD principles. For example, if fossil fuel prices were to rise, impacts on low income households needs to be considered, and where appropriate off-set. The dilemma is where this action works against the change in behaviour that is sought. The Working Group acknowledges that the challenge is to devise a package of measures which cushion lower income groups against adverse impacts, while also preserving incentives and options for behavioural change.

### **Maintenance of Ecological Systems, Protecting Biodiversity**

Transport has an impact on the ecology of the environment both directly and through its role in the development of other sectors which also impact on the environment. A transport sector consistent with this principle would need to:

- minimise the destruction of urban bushlands
- minimise the destruction of wilderness areas
- limit transport emissions which impact on ecological systems
- harmonise with and conserve natural systems.

### **Global Ramifications**

Some of the world's major environmental problems are global rather than local in nature. A good example involving transport is the accumulation of greenhouse gases.<sup>20</sup> Energy use for transport contributes around 15 percent of total carbon

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<sup>20</sup> For more information on greenhouse, see, Smith, S., 1995, *The Greenhouse Effect: Ramifications for New South Wales*. NSW Parliamentary Library Briefing Paper No. 011/95.

dioxide emissions.<sup>21</sup> Furthermore, our record for energy efficiency is poor, for instance, new Australian cars are the least efficient in the OECD in terms of litres consumed per 100 kilometres.<sup>22</sup> Australia needs to be aware of greenhouse gas emissions and coordinate action internationally.

### **Dealing Cautiously with Risk, Uncertainty and Irreversibility**

In its most simple form, this principle states that if the proposed action creates considerable uncertainty regarding local and regional impacts, the precautionary approach should be adopted. This means that more information should be gathered, or the activity simply not going forward. When assessing transport options, the precautionary approach would mean giving a higher weight to environmental impacts which are potentially severe and likely to be irreversible.

### **Conclusion of ESD Discussion**

The ESD Working Group noted that current transport patterns are violating ESD principles in a number of respects. Transport networks have been planned with no real consideration of the effect on future populations, costs are not transparent and do not reflect the full cost of providing the service. The construction of many transport networks, especially freeways, has led to many remnant urban bushland areas being destroyed. A key to improving the sustainability of transport is to increase the use of public transport networks.

## **PART FIVE: MODES OF TRANSPORT**

The number of people using public transport in Australian cities has been steadily falling for several decades. In the past, the concentration of jobs in the inner CBD's has provided the opportunity for workers to use public transport to get to work. With increasing decentralisation of work locations to middle suburban locations, outer area workers need to make commuting trips by car as the radial pattern of public transport makes cross-town bus and rail trips difficult.<sup>23</sup> Other criteria in which people will assess whether or not to catch public transport include:<sup>24</sup>

- convenience
- reliability
- passenger safety
- user friendliness

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<sup>21</sup> Commonwealth of Australia 1994, *Climate Change. Australia's national report under the United Nations Framework Convention on Climate Change*. AGPS Canberra.

<sup>22</sup> Pacific Power, 1994, *Draft Strategic Plan*, June 1994.

<sup>23</sup> *Ibid*, p.4.

<sup>24</sup> New South Wales Government, 1993, *Integrated Transport Strategy for Greater Sydney*.



- system attractiveness
- comparative travel time

This part of the paper details several transport modes and discusses the current situation for each of them.

## Roads

In the Introduction it was noted that the motor car was responsible for doubling the amount of urban transport over the period 1971-1991. As an example of this increase in road traffic, the combined Sydney Harbour Bridge and Harbour Tunnel annual traffic counts from 1987 to 1993 have increased by about ten million. This is shown in Table 1.

The level of traffic congestion on roads, especially during peak periods, is shown in Table 2. The trends (1984 - 1993) in AM peak speed for four selected major routes into the Sydney CBD are shown. The tables shows that peak travelling speeds have either fluctuated or slightly improved, with the exception of Victoria Road which has had a substantial drop in average speed. The construction of new roadways, such as the Gore Hill freeway and the Harbour Tunnel have led to the improvement in the average travelling speed. Similarly, the opening of the Glebe Island Bridge should increase average travelling speed for Victoria Road. These projects are a good indication of the amounts of money that has been invested in the Sydney road network in the last decade.

**Table 1 Combined Sydney Harbour Bridge and Tunnel Annual Traffic Trend 1987 - 1993. (in millions)<sup>25</sup>**

YEAR	NORTH	SOUTH	TOTAL
1987	33.8	32.3	66.1
1988	34.5	32.7	67.3
1989	34.3	31.9	66.2
1990	33.9	31.7	65.7
1991	34.2	31.9	66.2
1992	35.3	32.7	68.7#
1993	39.1	35.8	75.0

# Includes counts from the Tunnel which opened on 31 July, 1992.

<sup>25</sup> Data from Roads and Traffic Authority, 1994, *Road Use in New South Wales 1993*.

**Table 2 Trends in AM Peak Speed (km\h) for 4 selected Major Routes in the Sydney CBD Area<sup>26</sup>**

YEAR	PRINCESS HIGHWAY	PACIFIC HIGHWAY	PARRAMATTA HIGHWAY	VICTORIA ROAD
1984	32	32	28	29
1985	32	32	33	25
1987	34	27	31	26
1988	35	31	29	24
1989	34	28	26	21
1990	32	30	26	23
1991	38	31	27	25
1992	36	34	30	25
1993	32	38	29	22

The Roads and Traffic Authority notes the following issues related to car use:<sup>27</sup>

- Regional and local air quality, especially in the Greater Metropolitan Area
- Fuel consumption, energy efficiency and greenhouse gas emissions
- Flora and fauna protection and protection of remnant vegetation
- Water quality
- Recycling and waste minimisation
- Contaminated sites
- Traffic and construction noise
- Protection of Aboriginal and other sites and items of heritage significance.

There are a variety of traffic management measures that can be implemented to help reduce the impact of cars. The construction of bypasses and ring roads will help reduce city through traffic, whilst "smart" traffic signalling systems may help smooth traffic flows.<sup>28</sup>

<sup>26</sup> *Ibid*, p.42.

<sup>27</sup> Roads and Traffic Authority, 1994, *State Road Network Strategy. Technical Report for public discussion.*

<sup>28</sup> Commonwealth of Australia, 1995, *Timetabling for Tomorrow: An agenda for public transport in Australia.* The Australian Urban and Regional Development Review.

There has also been considerable development of intelligent vehicle and highway systems in many cities throughout the world. For instance, in the United Kingdom an electronic congestion meter is being developed, which will charge drivers according to speed being driven, with high charges when speeds are low.<sup>29</sup>

Bus only lanes, transit lanes, high occupancy vehicle lanes and traffic signal priority intersections are generally agreed to be beneficial to improving traffic flow.<sup>30</sup> However, the most obvious solution to reducing the impact of cars is not traffic management measures such as "S-lanes" and clever traffic lights but policies that will reduce the number of cars on the road. Many transport commentators believe that pricing is an important influence to favour public transport. For instance, traditional charges for road use tend to be too low to cover the net environmental and social costs of car use, whilst public transport charges do not reflect the net social and environmental benefits of public transport.<sup>31</sup> Reducing this inequality of pricing may help make public transport more attractive.

The implementation of road pricing policies, ie, increase road charges, has the potential to create social equity divisions in the community. Some observers have noted that road pricing will reserve the use of public roads for the better off, who can afford to pay, and business users who will pass on the costs to their consumers. The less well off will be forced to use public transport, assuming a satisfactory service is available.<sup>32</sup>

### Car pooling

Car pooling has shown some success in the United States, but lately the number of people car pooling has decreased. This is attributed to a variety of factors. With the rise in two income families, income earners must now take their children to childcare or school before work. This makes car pooling much more difficult due to the complexity of travel patterns. In the United States the number of workers sharing a ride to work fell from 19.1 million in 1980 to 15.4 million in 1990 despite significant efforts to promote car pooling, while the number driving alone increased from 62.2 million to 84.2 million over the same period.<sup>33</sup>

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<sup>29</sup> *Ibid*, p.123.

<sup>30</sup> Commonwealth of Australia, 1995, *op. cit.* p.124.

<sup>31</sup> Urwin, N. and Searle, G.,1991, "Ecologically Sustainable Development and Urban Development", in *Urban Futures. Issues for Australian Cities*, Special Issue No. 4, pp.1-12.

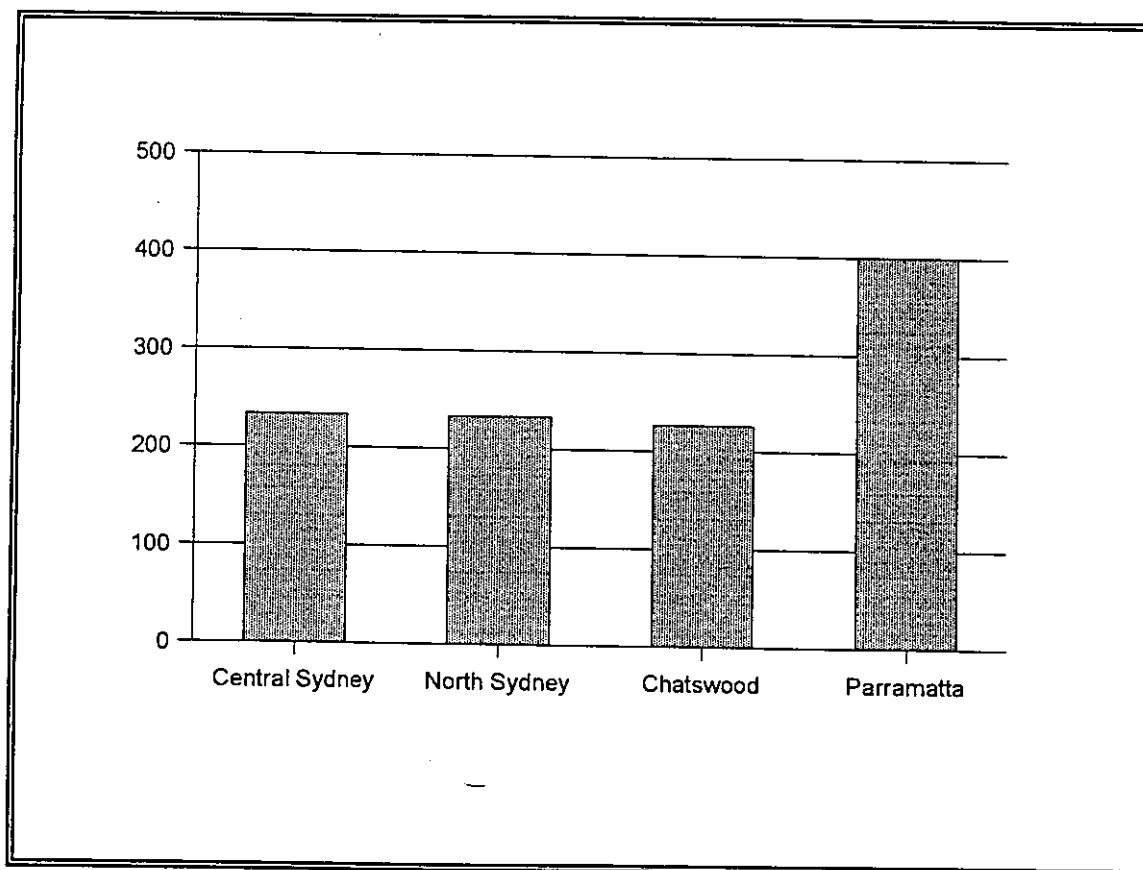
<sup>32</sup> Morris, B. 1993, "The Car User's Perspective" in Banister, D. & Button, K. (eds) *Transport, the Environment and Sustainable Development*. E & FN SPON.

<sup>33</sup> Commonwealth of Australia, 1995, *op. cit.* p.124.

### Parking controls/pricing

In the OECD the most popular policy measure to control car demand is parking controls and pricing. Research has shown the availability and cost of parking to be the key constraint on car use.<sup>34</sup> If people know in advance that parking is not going to be available, or very expensive, then alternate forms of transport are likely to be found. Apart from Central Sydney and North Sydney there has generally been an attempt in Sydney to satisfy demand for all day off-street parking in commercial centres to attract business and reduce the impact on surrounding residential streets.<sup>35</sup> This makes journeys to work more attractive at the expense of public transport use. Figure 3 provides a comparison of available parking per estimated employee in Central Sydney, North Sydney, Chatswood and Parramatta. The high level of parking availability reflects the comparatively low use of public transport to Parramatta.

Figure 3 Car Park Spaces per 1000 Employees<sup>36</sup>



<sup>34</sup> *Ibid*, p.126.

<sup>35</sup> New South Wales Government, 1993, *Integrated Transport Strategy for Greater Sydney. A first release for public discussion.*

<sup>36</sup> *Ibid*, p.44.

### Cycling as transport

The Bicycle Institute of New South Wales would like to see governments spend one percent of road expenditure on bicycle facilities. The Institute is proposing that major urban areas have a bicycle transport system based on a network of routes which will use a mixture of existing streets, off road paths and end trip facilities. Such a system for Sydney is estimated to cost \$10 million per year for the next decade, and is an attempt to make cycling a viable transport alternative. The RTA has already commenced work on the backbone of the system, a network of regional routes, which will need to be filled in by local feeder and cross-community routes.<sup>37</sup>

Cycling has clear ecologically sustainable advantages, with very little resource use and emission of pollution.

### Buses

The pattern of bus services in Sydney alters dramatically between the East and West of the city. Services in the east are generally focussed on the CBD and served by the State Transit Authority. The services follow the peak morning and evening commuter demand periods. This pattern alters across the city, with services in Penrith having a higher frequency in the inter-peak periods.<sup>38</sup>

Table 3 shows the proportion of passengers travelling to work by bus for different Local Government Areas. A greater proportion of residents from the inner city travel to work by bus than those from outer areas.

**Table 3 Proportion of Passengers travelling by bus to work<sup>39</sup>**

MUNICIPALITY	JTW BY BUS	JTW BY BUS AND TRAIN	TOTAL
Waverley	12.7	16.2	28.9
Leichhardt	23.1	4.2	27.3
Parramatta	3.8	4.1	7.9
Blacktown	1.7	5.2	6.3
Penrith	1.4	4.3	5.7

<sup>37</sup> Salomon, W., 1994, "New Directions", in *Push On*, June - July 1994.

<sup>38</sup> Smith, N., 1994, "The Local Bus - How far can it go?" in *Proceedings, 7th National Conference, Australian Institute of Traffic Planning and Management*. 26-27 May 1994, Sydney.

<sup>39</sup> *Ibid*, p. 6.

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This table shows that buses are far less significant for journeys to work the further you go from central Sydney.

Smith identifies a number of restraints on the development of bus services in outer Sydney. These include:

- The commercial orientation reflected in the Public Transport Act
- Lack of infrastructure, where buses are limited to the capacity of the suburban road network in which they serve. This often means operating through heavily congested areas with few bus priority measures in place
- Physical restraints on bus use, including traffic calming measures such as speed humps that both slow services and increase discomfort, and bad route planning through areas such as shopping car parks. Smith considers that the greatest single restraint on developing bus services in new areas has been the design of street patterns. Buses have been locked out from many new developments until years after the first residents have moved in and established their travel patterns, usually car based
- Franchised areas that provide an operator with a secure base, but works against the development of any services that operate other than to the nearest railway station or shopping centre. For instance, express bus services to the CBD may not be viable unless pickups can be made in other franchise areas en-route, but the Transport Act does not allow this

### Improving the Urban Bus Service

Bus operators have been able to increase their patronage with a variety of improvements and marketing. For instance, in Penrith, Westbus replaced conventional buses with twenty six 28 seat minibuses, and patronage increased by 39% in twelve months.<sup>40</sup> However, these increases were generally achieved outside the commuter peak, when traffic congestion is at its lowest.

Commuter services may be improved with bus priority measures, often involving relatively small expenditures. Major infrastructure developments such as busways, which separate buses from other traffic, can lead to substantial increases in patronage. The only Australian busway is in Adelaide, which also incorporates German O-Bahn technology. Special buses fit to constructed tracks, providing for higher operating speeds but at a greater construction cost, and with less flexibility as only certain buses can be used on the track. Over a nine year period patronage on the Adelaide busway has increased by 60%, in an area with low population densities, high car ownership, few restraints on private car ownership and declining

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<sup>40</sup> *Ibid*, p.12.

system wide patronage.<sup>41</sup>

## Trains

City Rail has the most extensive city based heavy rail network in Australia, but until recently has experienced reduced patronage. For instance, in the last financial year 234.8 million journeys were made on State Rail, five million more than the previous 12 months but eight million fewer than 1989-90.<sup>42</sup>

Infrastructure spending on rail in Sydney has increased from \$430 million in 1987-88 to almost \$800 million in 1992-93. Much of this spending has been on improving track, signalling systems and rolling stock.<sup>43</sup> Very little rail line has been constructed in Sydney since the Second World War, once cars became more common. It was once accepted that a road would service a new residential growth area, and that when this road became congested it was time to construct a railway to service the new growth. In reality, a new road was built or the existing one expanded. Other possible reasons for a lack of rail line extension over the last fifty years include a Treasury that considers that railways lose money, and therefore bigger railways lose greater amounts of money. Infrastructure capital has therefore not been easily available for railway extensions.

The road lobby has also been very successful over the last few decades, with many diverse groups, large companies and interests successfully lobbying governments for support of roads. In contrast, the rail lobby is more insular, is government and union based and has had less success gaining support from governments for the expansion of railway operations.

It is now acknowledged that new rail lines need to be constructed. The Sydney train system is reaching capacity in some areas, most notably approaching the CBD between Sydenham and Erskineville.<sup>44</sup>

The recently elected Carr Government has promised the following additions to the rail network:<sup>45</sup>

- \$50 million to upgrade track between Granville, Lidcombe, Strathfield and Central, enabling more services between Liverpool/Parramatta and City Circle

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<sup>41</sup> *Ibid*, p.14.

<sup>42</sup> Morris, L. 1995, "Shake up for city commuter services" in *The Sydney Morning Herald*, 18 April 1995.

<sup>43</sup> Commonwealth of Australia, 1995, *op.cit.* p.68.

<sup>44</sup> State Rail Authority, 1994, *State Rail Strategic Plan 1994-2016, City Rail*.

<sup>45</sup> Carr, B. 1995, *Press Release. Rail Expansion for Sydney's West*. February 15, 1995.

- \$20 million to duplicate the Blacktown to Riverstone line
- \$60 million to increase the number of tracks between Riverwood and Turrella, allowing an increased number of services from Campbelltown and Macarthur region to the City along the Glenfield/Easthills line
- \$77 million to upgrade Sydenham Junction, relieving the congestion caused by the merging of the Illawarra, East Hills and Bankstown lines.
- After detailed feasibility studies, construction will commence on the cross-regional, Parramatta-Hornsby rail link.

The above works all target CityRail identified capacity constraint areas.

The new Southern Line, linking Central station with Kingsford Smith Airport and the East-hills line is expected to be in operation by the Year 2000. The line is a good example of linking major destinations with public transport whilst providing the infrastructure to increase population density.

The convenience and integration of public transport is also an important criteria for the public when making the decision on what transport to take. An integrated ticketing system between trains, buses and ferries was a key part of the new Labor government's transport policy. This will hopefully lead to a much more customer friendly public transport network, with easy change overs from one mode to another.

#### **On Demand Services/Personal Public Transport**

Most conventional public transport is focussed on radial trips to central business districts. Now that these trips represent a declining proportion of travel, new transport means need to be developed that go cross-town, outside peak hours, for non-work purposes and that have no definite travel patterns.<sup>46</sup>

Personal public transport (PPT), where the public can dial a transport service to come to their door or nearby location is seen as a key way to service this market. During the 1980's many German firms developed computerised semi-on-demand systems suitable for minibuses. In the German town of Wunsdorf, serving a population of 40,000 in a 100km square area, the trials resulted in an 80 percent increase in patronage compared to the fixed route, fixed schedule services which operated previously.<sup>47</sup>

In Wollongong an attempt to utilise this sort of technology was trialled using two local bus companies with mostly standard buses and a semi-demand responsive

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<sup>46</sup> Commonwealth of Australia, 1995, *op. cit.* p.106.

<sup>47</sup> *Ibid*, p.105.



system. The main feature was the ability of buses to divert from their normal route to a pickup closer to the customer. However, customers had to ring 24 hours in advance of "booking a bus", there was only a once per hour service, and routes were essentially fixed, focused on the shopping centre. The trial was discontinued at the end of its 12 month period.<sup>48</sup>

Key factors crucial to a successful PPT program include:

- convenience for the passenger is critical, systems that do not allow genuine on demand services, or which do not allow passengers to call from bus stops, are unlikely to attract much additional patronage.
- costs are likely to be higher than normal scheduled services, and fares will need to be higher than standard bus fares if costs are to be recovered.

These factors are being incorporated into a feasibility study of a PPT program for Perth. If it proceeds, the Perth program will include:

- Approximately 450 "electronic bus stops" in a 40 square km area covering the Perth central area. About half of these will be on standard routes and will incorporate real time displays giving indications of the arrival time of the next scheduled service.
- Probably three fleets (taxis, maxitaxis and minibuses) providing a choice of three types of on-demand services. These will have fares ranging from 50 percent to 100 percent of taxi fares.
- Automatic multihire despatching and passenger booking software
- Control of vehicle fleets from a control centre, with all vehicles fitted with tracking devices.

The feasibility studies of the above project suggest the following outcomes:

- PPT was seen as meeting many of the current deficiencies in public transport, particularly by improving information, flexibility and affordability (compared with taxis)
- The systems required to make PPT work all exist and the major technical task is one of integration
- A mixed fleet of 90 PPT vehicles (taxis, maxitaxis and minibuses) operating in the pilot area would handle approximately 8300 trips per day, with average waiting times of 7.5 minutes and average speeds of 25-33 kph.

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<sup>48</sup> *Ibid*, p.105.

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- There are a number of possible operational arrangements for owning and operating a PPT system, including joint venture arrangements between private and public sector
  - Total start up costs for a PPT pilot system, when divided by the number of annual trips, are of the order \$3.50 compared with \$20-25 for busways, \$27.50 for an extension of the existing rail system, and \$63-74 for various light rail system options evaluated.
  - There is a reasonable prospect of using PPT to enhance the public transport system significantly, with little by way of either capital or general on-going operational subsidies.<sup>49</sup>

The personal public transport system is clearly an option that could have great potential for operation in Sydney and other urbanised areas. The system provides a vision for a future which does not revolve around the private car, and satisfies many of the tenets of ecologically sustainable development.

## **PART SIX: CONCLUSION**

As noted, transport in Sydney is reaching saturation point, both on the roads and on public transport. There has been considerable investment in roads (motorways and tollways) in Sydney over the last few years, and many consider it is now time to plan cities in a form to reduce our car dependency.

The concepts of ecologically sustainable development have been outlined in this paper, with one of the key factors being the pricing of transport. An analysis of the costs of transport needs to include economic, social and environmental costs. However, the market itself may not be enough to bring about change that meets the requirements of sustainable development.

Change needs to come about from the individual user perspective, such as choice of mode of transport, and from governments who provide infrastructure networks to assist that choice. The convenience of the private car can, it seems, only be overcome with an efficiently operating public transport system.

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<sup>49</sup> *Ibid*, p.107.